Patent Claims

1. Catalyst for exhaust-gas purification in lean-burn engines, characterized in that the catalyst comprises at least the following components:

(i) iron oxide,
(ii) platinum or rhodium or a mixture of platinum and rhodium as active metal,
(iii) a support oxide,

the support oxide containing zirconium oxide, cerium/zirconium mixed oxide or mixtures of these compounds if the active metal used is platinum alone, or the support oxide containing zirconium oxide, cerium/zirconium mixed oxide, aluminium oxide, aluminosilicate, silicon oxide, zeolite or mixtures of these compounds if the active metal used is rhodium or a mixture of platinum and rhodium.

2. Catalyst according to Claim 1, characterized in that it comprises a promoter selected from the group consisting of rare earth oxide, gallium oxide or indium oxide or mixtures of these compounds.

3. Catalyst according to Claim 1 or 2, characterized in that the iron oxide, the active metal and, if present, the promoter are jointly present on the support oxide.

4. Catalyst according to one of Claims 1 to 3, characterized in that its X-ray diffractogram does not have any reflections which are characteristic of the iron oxide.

5. Catalyst according to one of the preceding claims, characterized in that the mass ratio, based on the metal elements, of the total iron oxide used relative

to the total active metal used is in a range from 1 : 1 to 10 : 1.

6. Catalyst according to one of the preceding claims, characterized in that the total active metal used forms a proportion of 0.1% by weight to 5% by weight relative to the total support oxide used.

7. Catalyst according to one of the preceding claims, characterized in that the at least one rare earth oxide is selected from the group consisting of La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu oxide and mixtures or mixed oxides of at least two of the abovementioned oxides.

8. Catalyst according to one of the preceding claims, characterized in that the mass ratio, based on the metal elements, of the total promoter used relative to the total active metal used is in a range from 1 : 1 to 20 : 1.

9. Catalyst according to one of the preceding claims, characterized in that it is in the form of a powder, granules, an extrudate, a shaped body or as a coated honeycomb body.

10. Catalyst according to one of the preceding claims, characterized in that it comprises an NO_x storage component.

11. Catalyst according to Claim 10, characterized in that the NO_x storage component is selected from the group consisting of oxides or carbonates of Ba, Sr, La, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, on a porous support oxide.

12. Process for producing a catalyst according to one of Claims 1 to 11, characterized in that it comprises

bringing the iron oxide (i) or an iron compound from which the said iron oxide is formed as a result of a heat treatment into contact with the active metal (ii) and the support oxide (iii).

13. Use of a catalyst according to one of Claims 1 to 11 or of a catalyst produced as described in Claim 12 for removing pollutants from exhaust gases from lean-burn engines.

14. Method for purifying the exhaust gas from lean-burn engines in the rich/lean and/or constant lean mode, characterized in that a catalyst according to one of Claims 1 to 11 or a catalyst produced as described in Claim 12 is used.

15. Method according to Claim 14, characterized in that the rich/lean mode is realized in alternating rich and lean cycles, with the ratio of the duration of lean cycles to the duration of rich cycles, in normal driving mode, being at least 10 : 1, and the absolute duration of a lean cycle in normal driving mode being from 10 seconds to 180 seconds.

16. Method according to Claim 14 or 15, characterized in that the exhaust-gas purification comprises the oxidation of hydrocarbons and carbon monoxide and the reduction of nitrogen oxides, and optionally also, in the case of diesel engines, the removal of particulates.

17. Method according to one of Claims 14 to 16, characterized in that the lean-burn engine is selected from the group consisting of spark-ignition engines with direct petrol injection, hybrid engines, diesel engines, multi-fuel engines, stratified charged engines and spark-ignition engines with unthrottled part-load operation and higher compression or with unthrottled

part-load operation or higher compression, each with direct injection.

18. Method according to one of Claims 14 to 17, characterized in that the catalyst is installed in a position close to the engine or in an underfloor position.

19. Method according to one of Claims 14 to 18, characterized in that an NO_x sensor is used to control the rich/lean cycle, and a richer phase is induced precisely when a predetermined NO_x limit value is exceeded.

20. Method according to one of Claims 14 to 19, characterized in that the catalyst is used in any desired combination with at least one of the catalysts or filters selected from the following group: starting catalyst, HC-SCR catalyst, NO_x storage catalyst, λ-controlled three-way catalyst, particulate filter, soot filter.